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OCEANOGRAPHY.—*The tide at Tahiti.*[1] H. A. MARMER, Coast and Geodetic Survey.

Particular interest attaches to the tide at Tahiti since this island furnishes a striking exception to the general rule that "the tide follows the moon." Instead of coming later each day by about 50 minutes, high water here generally comes about noon and midnight and low water about six o'clock in the morning and six o'clock in the evening.

Precise data with regard to the tide at Tahiti have been wanting. Only short series of observations appear to have been made, and these, for the greater part, a number of years ago. Recently, however, at the instance of the U. S. Hydrographic Office an excellent series of automatic tide records covering several years has been secured by Mr. Harrison W. Smith of the Massachusetts Institute of Technology, who was sojourning in Tahiti. The tide gauge was installed in Papeari Harbor on the southern coast of Tahiti, in latitude 17°45′S., longitude 149°22′W.

A harmonic analysis of a year of these observations has been made at the Coast and Geodetic Survey, a series of hourly heights 369 days in length beginning Feb. 1, 1924, being used. The results derived from the direct analysis were cleared for the effects of other components, the analysis and clearance being made in accordance with the procedure given in Harris' *Manual of Tides* and in Schureman's *Harmonic Analysis and Prediction of Tides.* The results derived are given in Table 1.

Several of the lesser components were derived, not from analysis, but by inference from other components. Such inferred values are enclosed in parentheses. The formulae used for inferring the amplitudes and epochs of these components are as follows:

$2N = 0.133N_2$, $2N^\circ = 2N_2^\circ - M_2^\circ$; $R_2 = 0.008S_2$, $R_2^\circ = S_2^\circ$;
$T_2 = 0.059S_2$, $T_2^\circ = S_2^\circ$; $\lambda_2 = 0.007M_2$, $\lambda_2^\circ = S_2^\circ - 0.536\,(S_2^\circ - M_2^\circ)$;

[1] Received February 10, 1927.

$\mu_2 = 0.024M_2$, $\mu_2° = 2M_2° - S_2°$; $\nu_2 = 0.194N_2$, $\nu_2° = M_2° - 0.866(M_2° - N_2°)$.

From the harmonic constants above, it is seen that the tide at Tahiti is of the semidaily type, the ratio of $K_1 + O_1$ to M_2 being 0.29. The peculiar behavior of the tide here is evidenced in the relatively large value of S_2 as compared with M_2, the ratio being 0.88. The ages derived from these constants are: phase age 29 hours, parallax age −4 hours, and diurnal age −14 hours. The spring range, from the harmonic constants, is 1.1 feet, and the neap range 0.1 foot.

TABLE 1.—HARMONIC CONSTANTS, TAHITI

COMPONENT	H	κ	COMPONENT	H	κ
	feet	°		*feet*	°
K_1	0.036	278	O_1	0.048	293
K_2	0.075	20	P_1	0.013	253
L_2	0.010	1	Q_1	0.014	290
M_1	0.003	115	R_2	(0.002)	(20)
M_2	0.291	351	S_1	0.005	88
M_3	0.008	195	S_2	0.255	20
M_4	0.012	136	S_4	0.002	149
M_6	0.006	122	T_2	(0.015)	(20)
M_8	0.002	148	λ_2	(0.002)	(4)
N_2	0.061	353	μ_2	(0.007)	(322)
2N	(0.008)	355	ν_2	(0.012)	(352)

A nonharmonic analysis from the tabulation of the high and low waters, gives a mean range of 0.78 foot, a spring range of 0.97 foot, and a neap range of 0.58 foot. It will be noted that the mean and the spring ranges, from the high and low waters, do not differ much from the corresponding ranges derived from the harmonic constants. The neap range, however, from the high and low waters is considerably greater. Undoubtedly this is to be ascribed to the relatively large effects of disturbances due to meteorological conditions on a tide of such small range. From the high and low waters the lunitidal intervals derived are 12^h09^m for the high water, and 5^h53^m for the low water.

Since S_2 is somewhat smaller than M_2 it is obvious that the oft-repeated statement that the tide at Tahiti comes at the same time every day, is only a rough approximation. The tabulations show that there is some progression in the time of tide from day to day. This progression is considerably less than 50 minutes about the time of spring tides and considerably more about the time of neap tides.

At spring tides high water comes about noon and midnight, and low water about six o'clock both morning and afternoon. At spring tides the tide has its greatest range and is therefore most noticeable while at neap tides the times of high and low water are difficult to determine. Apparently, therefore, the characteristics of the spring tides here have been taken as the average characteristics.

BOTANY.—*New plants from Central America.*—VII.[1] PAUL C. STANDLEY, U. S. National Museum.

The new species described on the following pages are mostly plants collected by myself in Costa Rica during the past two years. They include representatives of four South American genera now reported for the first time from North America: *Puya* and *Greigia* of the Bromeliaceae; *Ophiomeris*, a curious member of that small family, Burmanniaceae, related to the orchids; and *Panopsis*, of the Proteaceae. One of the new species described, a *Brunellia*, is a Mexican tree.

Several of the descriptions have been contributed by other writers—that of a Salvadorean *Agave* by Dr. William Trelease; those of three Panamanian Caesalpiniaceae by Dr. J. N. Rose; and those of a new *Scutellaria* and a *Mendoncia* by Mr. Emery C. Leonard.

Puya dasylirioides Standl., sp. nov.

Plants large, terrestrial, 1–2.5 m. high; leaves mostly in a large dense basal cluster, stiff, 30–60 cm. long and larger, at base (above the sheaths) about 5 cm. wide, evenly tapering to the long-attenuate subulate apex, thick, finely striate, yellow-green, glabrous on the upper surface, beneath finely and closely whitish-lepidote; leaf-margins armed with sharp-pointed ascending blackish broad-based spinose teeth 4–5 mm. long and 1–4 cm. apart, the tip of the blade often unarmed; leaf-sheaths somewhat inflated but hard, dark brown, 7–8 cm. wide, the upper part of the sheath armed with minute close-set teeth; leaves of the stem similar to the basal ones but shorter, decreasing in size upward, the uppermost unarmed or nearly so and with thin brown papery sheaths; uppermost bracts of the stem 7–8 cm. long, much exceeding the internodes, loosely imbricate, abruptly acuminate into an ensiform blade 1.5–2 cm. long, sparsely arachnoid-villous with short whitish hairs; inflorescence spikelike, 30 cm. long or longer, 5–7 cm. thick, very dense and many-flowered; floral bracts similar to those of the stem but shorter, slightly exceeding the flowers, thin, dark brown, subulate-acuminate, short-villous; partial inflorescences few-flowered, about 3 cm. long, dense, the pedicels very thick, 1 cm. long, thinly brownish-tomentose; sepals 12 mm. long, ovate-

[1] Published by permission of the Secretary of the Smithsonian Institution. For the last preceding number of this series of papers see This JOURNAL 17: 7–16. 1927. Received January 26, 1927.

oblong, narrowed to the obtuse apex, striate, thinly tomentose; capsule subglobose, 3-sulcate, about 12 mm. long and broad, rounded at base and apex, glabrous; seeds very numerous, the body blackish brown, 2 mm. long, longitudinally striate and pitted between the striae, the wing whitish.

Type in the U. S. National Herbarium, nos. 1,252,726–1,252,727, collected in the Laguna de la Chonta, northeast of Santa María de Dota, Province of San José, Costa Rica, altitude 2,100 meters, Dec. 18, 1925, by Paul C. Standley (no. 42334). Juvenile plants (no. 43653) collected in the paramos of the Cerro de las Vueltas, at 3,000 meters, probably are referable to the same species. I did not see any adult plants in the latter region.

Puya dasylirioides is the most conspicuous plant of the Laguna de la Chonta, which is a sphagnum bog of several acres, occupying probably an old crater, and inclosed on all sides by dense wet forest. The plants grow in great numbers everywhere except in the deep water, their tall stiff stems (all in fruit in December) suggesting mullein stalks. This lake is one of the most remarkable localities from a botanical standpoint that I have ever seen. It yielded a substantial number of curious plants that I have not found elsewhere in Costa Rica.

The genus *Puya*, represented in the high mountains of South America by over 40 species, has not been reported from North America. The Costa Rican plant, according to Mez's monograph, is related to the imperfectly known *P. Goudotiana* Mez, of Bogotá. The leaves, with their hard broad bases and narrow spine-margined blades, strongly suggest those of some species of *Dasylirion*. They show upon their faces the impressions of the spiny margins of the adjacent leaves, produced by mutual pressure in the dense rosette which they form, a feature characteristic of the genus *Dasylirion*.

Greigia sylvicola Standl., sp. nov.

Plants large, terrestrial, arising from elongate rootstocks, the stems stout, 1–1.5 m. high, densely leafy; leaves linear, 130 cm. long or shorter, 12–18 mm. wide, long-attenuate to the apex, somewhat dilated at base into a short, slightly inflated sheath 3–4 cm. wide; sheaths densely dotted with large, closely appressed, brown scales, the blades with a few minute brown scales but appearing glabrous, finely striate, thin, when fresh bright green; margins of the sheath unarmed, those of the blade just above the sheath (for 15–18 cm.) armed with numerous antrorse, dark brown, spinose teeth 1.5–3 mm. long and 8–22 mm. apart, the margins along the middle of the blade for the greater part of its length unarmed or with minute teeth, the apex of the blade for 20–25 cm. finely and densely spinose-serrate; inflorescence terminal, nearly hidden among the leaves, headlike, many-flowered, about 5 cm. long and broad, borne on a stout bracted stalk 4 cm. long; bracts equaling the sepals, green, linear-lanceolate to (outer ones) ovate, thin, long-acuminate, sparsely brown-lepidote, entire below, toward the apex densely serrate with coarse brown broad-based incurved teeth; flowers sessile; ovary turbinate, 3-angled, 10–15 mm. long, 5 mm. broad; sepals free, green, lanceolate, about 2 cm. long, long-acuminate, entire, spinose at apex, sparsely brown-lepidote; immature fruit about 1.5 cm. long and 1 cm. thick, many-seeded.

Type in the U. S. National Herbarium, no. 1,252,555, collected in forest near Laguna de la Escuadra, northeast of El Copey, Province of San José, Costa Rica, altitude about 2,200 meters, Dec. 16, 1925, by Paul C. Standley (no. 41975).

This bromeliad is frequent in the high mountains of the Cantón de Dota, but although locally abundant, fertile plants were found only once. The plants grow in the densest and wettest forest of oak and bamboo, usually in the darkest swamps or in running water, associated with begonias and Lobeliaceae. The following sterile specimens, all from the same region, are referred to this species:

COSTA RICA: Near Finca La Cima, above Los Lotes, alt. 2,400 m., *Standley* 42797. Laguna de la Chonta, northeast of Santa María de Dota, alt. 2,100 m., *Standley* 42357. Cerro de las Vueltas, alt. 3,000 m., *Standley* 44009.

The genus *Greigia* (Bromeliaceae) has not been reported north of Colombia. It consists of half a dozen species which range southward into Chile. The Costa Rican plant is related, according to description, to *G. albo-rosea* (Griseb.) Mez, of Venezuela, which has broader leaves and larger flowers.

Vriesia disticha (L.) Standl.

Renealmia disticha L. Syst. Nat. ed. 10. 974. 1759.
Tillandsia heliconioides H. B. K. Nov. Gen. & Sp. **1**: 234. 1815.

Pogomesia leiocalyx (Clarke) Standl.

Pogomesia Raf. (1836) is the oldest name for the genus of Commelinaceae to which the name *Tinantia* Scheidw. (1839) has been more generally applied.
Tinantia leiocalyx Clarke, Bot. Gaz. **18**: 211. 1893.

Pogomesia erecta (Jacq.) Standl.

Tradescantia erecta Jacq. Coll. Bot. **4**: 113. 1790.
Tinantia erecta Schlecht. Linnaea **25**: 185. 1852.

Agave compacta Trelease, sp. nov.

Section *Guatemalenses*. Acaulescent, not cespitose. Leaves gray-green, not transversely banded, fleshy, oblanceolate-obovate, upcurved above the thick contracted base, acuminate, plicate upwards, smooth, about 100 cm. long and 25 cm. wide; spine light brown, dull, smooth, straight, acicular, involutely grooved from above the middle with acute edges, decurrent for more than its own length, about 50 by 5 mm.; teeth brown, 10–20 mm. apart, scarcely 3 mm. long in the middle and reduced upwards and downwards, triangular from lenticular bases, nearly straight, the margin straight between them. Inflorescence densely paniculate, ovoid, 2.5 m. tall and half as broad, the scape about equaling the leaves, the horizontal branches few-parted at the end, their divisions very compactly flowered; pedicels scarcely 10 mm. long; flowers yellow, about 40 mm. long; ovary 20 mm. long, equaling the perianth, oblong; tube openly conical, about 5 mm. deep; segments 15 mm. long, shorter than the ovary; filaments inserted toward the throat, 35 mm. long, more than twice as long as the segments. Fruit unknown; freely bulbiferous.

Type in the U. S. National Herbarium, nos. 1,208,021–1,208,024, taken from a plant cultivated in the Patio de Ensayos, San Salvador, Salvador, by Salvador Calderón (no. 2251).

Unique in its short compact panicle, commencing at the height of the leaf tips.

Heliconia Lankesteri Standl., sp. nov.

Plants of medium size for the genus, 1.5–2.5 m. high; petioles long and slender, glabrous, the sheaths glabrous, tinged with red; leaf-blades oblong-elliptic, about 75 cm. long and 25 cm. wide, abruptly short-acuminate, rounded at base, thin, glabrous, green on both surfaces; inflorescence erect, pedunculate, deltoid, about 30 cm. long and wide, glabrous throughout or nearly so, the rachis thick and stout, conspicuously zigzag, the internodes 1–3 cm. long; bracts about 16, slightly upcurved from near the base, cherry-red or dark yellow, long-attenuate to an obtuse tip, closely set, the upper basal margin of one bract nearly reaching the base of the next higher bract; lowest bract as much as 32 cm. long, the middle ones about 12 cm. long, strongly concave, the bases 1.5–2.5 cm. high; flowers numerous, dark yellow or red, 4.5 cm. long, glabrous; fruits pedicellate, partly exserted from the bracts, subglobose, about 1 cm. in diameter.

Type in the U. S. National Herbarium, nos. 1,228,683–1,228,684, collected in wet forest at La Estrella, Province of Cartago, Costa Rica, March 26, 1924, by Paul C. Standley (no. 39494). To this species may be referred the following additional collections:

COSTA RICA: Vicinity of Orosi, Prov. of Cartago, *Standley* 39927. Forests of El Copey, Prov. of San José, alt. 1,800 m., *Tonduz* 11821.

This plant is related to *H. adflexa* (Griggs) Standl. (*Bihai adflexa* Griggs)[3] a Guatemalan species which differs in its pubescent rachis and narrower, much more distantly spaced bracts.

The species is named for Mr. C. H. Lankester, in whose company I made the excursion to La Estrella, where the type was collected.

Heliconia tortuosa (Griggs) Standl.

Bihai tortuosa Griggs, Bull. Torrey Club **30**: 650. 1903.

Heliconia straminea (Griggs) Standl.

Bihai straminea Griggs, Bull. Torrey Club **42**: 327. 1915.

Ischnosiphon elegans Standl., sp. nov.

Plants erect, 1–1.5 m. high, much branched, the branches slender; leaf sheaths 4–14 cm. long, conspicuously nerved, puberulent or glabrate; petioles 2.5 cm. long or less, the lower portion puberulent or scaberulous, the callus terete, glabrous; leaf-blades oblong-ovate, 6–17 cm. long, 3–6.5 cm. wide, abruptly acuminate, obtuse or rounded at base and usually abruptly contracted, thin, green, glabrous; spikes solitary, short-pedunculate, 20–25 cm. long, 6–8 mm. thick, the internodes about 2 cm. long, thinly pilose with

[3] Bull. Torrey Club **42**: 325. 1915.

short white hairs; bracts usually 10, lanceolate, 3.5–4 cm. long, acute, green, appressed or ascending, coriaceous, thinly pubescent, especially near the margins, finely nerved; flower 1 in each bract, sessile; ovary glabrous; bractlets oblong-linear, 2.3 cm. long, hyaline, rounded at apex and densely white-pilose; sepals narrowly linear, 2 cm. long, pilose; corolla white, the tube filiform, over 3 cm. long, white-pilose, the lobes 1 cm. long; capsule cylindric, 1.5 cm. long, pilose at apex; seed and aril together 12 mm. long, 3 mm. thick, smooth, mottled with light and dark brown, the aril 3 mm. long.

Type in the U. S. National Herbarium, no. 1,253,581, collected in moist forest near Tilarán, Guanacaste, Costa Rica, altitude 600 meters, January, 1926, by Paul C. Standley and Juvenal Valerio (no. 44251). The following additional collections, all from Guanacaste, illustrate the same species:

COSTA RICA: Tilarán, *Standley & Valerio* 46623. Naranjos Agrios, alt. 600 m., *Standley & Valerio* 46487, 46460. El Silencio, *Valerio* 64.

The only other Central American species, which grows in Panama, *I. leucophaeus* (Poepp. & Endl.) Koern., has large broad leaves, whitish beneath, and clustered spikes. The Costa Rican plant is related to *I. gracilis* (Rudge) Koern., of Brazil and the Guianas, a species with narrower leaves, more slender spikes, and seeds twice as large.

Ophiomeris panamensis Standl., sp. nov.

Plant hyaline, white, glabrous, the stem about 6 cm. long, 1.3 mm. thick, naked, subflexuous; flower solitary, terminal, 2 or 3-bracteate at base, the bracts lance-oblong to ovate, 1.5–3 mm. long, appressed; perianth campanulate, gibbous, 15 mm. long in its greatest length, about 10 mm. wide, at base abruptly narrowed, the orifice oblique, 8 mm. broad; corolla limb 6-parted, the 3 outer lobes short, ovate, and 3 inner ones about 3 cm. long, flexuous, filiform, dilated at base, spirally included in bud; stamens 6, equal, free, opposite the perianth lobes, the filaments deflexed, expanded into petaloid blades, these emarginate at apex; anthers small, 2-celled, the cells collateral, almost parallel, longitudinally dehiscent; ovary adnate to the perianth, free at apex and rounded, 1-celled, many-ovulate; style 1.5–2 mm. long, the 3 stigmas short, erect.

Type in the U. S. National Herbarium, no. 1,269,478, collected along the Pearson Trail on Barro Colorado Island in Gatún Lake, Canal Zone, Panama, July 11, 1925, by C. W. Dodge (no. 3484). Collected also along the Shannon Trail on the same island, July 17, 1925, *Dodge* 3460.

This is the first representative of the family Burmanniaceae, subfamily Thismieae, to be reported from tropical North America. One other member of the group, *Sarcosiphon americanus* (Pfeiffer) Schlechter, was found a few years ago near Chicago, a truly remarkable record, inasmuch as the other plants of the family are tropical in distribution.

The available material of the Panama plant is very scant, and the plant is so delicate that in the dried state it is difficult to determine its characters satisfactorily. According to the most recent treatment of the group, by Schlechter, it seems to agree best with the genus *Ophiomeris*, of which two species, both Brazilian, are known. In *O. macahensis* Miers the orifice of the perianth is small and lateral, while in *O. panamensis* it is merely oblique,

and much larger. In the latter, also, the anther cells are much less divergent than in the Brazilian species.

It is strange that this plant has not been found in Panama by other collectors, especially since Prof. Dodge states that it was plentiful on Barro Colorado in the summer of 1925. It may well be that it is an ephemeral plant, found only when conditions are exceptionally favorable, and having a growth period of very few weeks.

Myrica phanerodonta Standl., sp. nov.

Shrub 2.5–3.5 m. high, the older branches subterete, blackish, the young ones stout, sparsely or densely pubescent or glabrate, gland-dotted, densely leafy, the internodes about 1 cm. long; petioles stout, 2–6 mm. long, puberulent; leaf-blades obovate or oblong-obovate, 3–6 cm. long, 1.3–2.8 cm. wide, obtuse to rounded at apex, acuminate to broadly cuneate at base, coriaceous, serrate, the teeth about 10 on each side, salient, scarcely 1 mm. long, the blades deep green above, puberulent along the costa, slightly paler beneath, rather sparsely gland-dotted, puberulent on the prominent costa or glabrate, the lateral nerves very slender, plane or slightly elevated, straight or subarcuate, extending to the margin; staminate aments axillary, solitary, sessile, 10–18 mm. long, 4 mm. thick; anthers 1 mm. long.

Type in the U. S. National Herbarium, no. 799175, collected on the summit of the Volcán de Poas, Costa Rica, altitude 2,644 meters, November, 1896, by A. Tonduz (no. 10785). The following collections represent the same species:

COSTA RICA: Upper slopes of Volcán de Poás, *Standley* 34884. Cerro de Zurquí, Prov. Heredia, alt. 2,200 m., *Standley & Valerio* 50423.

Related to *M. parvifolia* Benth., of Colombia, which lacks the numerous salient teeth that mark the leaves of *M. phanerodonta*.

MYRICA PUBESCENS Willd. Sp. Pl. **4**: 746. 1805.

Heretofore only a single species of *Myrica*, *M. mexicana* Willd. (*M. xalapensis* H. B. K.), has been known from Central America. This is a common and widely distributed plant, frequent in Costa Rica. It is strange that there has not been collected in Costa Rica long ago the Colombian *Myrica pubescens* Willd., a well-marked species, common in central Costa Rica, and occurring in the vicinity of both Cartago and San José, which are not exactly unexplored regions. The name "encinillo" is applied to the tree. The following collections of *M. pubescens* are in the National Herbarium:

COSTA RICA: Vara Blanca to La Concordia, *Maxon & Harvey* 8477. Río Reventado, Cartago, *Standley & Valerio* 49386. Between Aserrí and Tarbaca, *Standley* 34058, 41356. Quebradillas, *Standley* 43018. Santa María de Dota, *Standley* 41574. Cerro de Piedra Blanca, above Escasú, *Standley* 32457, 32586.

Panopsis costaricensis Standl., sp. nov.

Large shrub or tree, 5–10 m. high, the branchlets glabrate, densely leafy, brownish, bearing numerous pale elevated lenticels; leaf buds densely ferruginous-sericeous; petioles stout, 4–10 mm. long, glabrous; leaf-blades oblanceolate-oblong or obovate-oblong, 6–20 cm. long, 2–6 cm. wide, obtuse

or rounded at apex, cuneately narrowed at base, subcoriaceous, lustrous, entire, concolorous or when dry sometimes brownish beneath, the venation conspicuous on both surfaces, coarsely reticulate, the principal lateral nerves about 6 on each side, very irregular; flowers yellowish white, racemose, the racemes few, forming a terminal panicle, the rachises 8–13 cm. long, many-flowered, floriferous nearly to the base, thinly pilose with minute, mostly appressed, brownish hairs; bracts linear-subulate, about 6 mm. long; pedicels divaricate, slender, 3–4 mm. long, pubescent like the rachis; perianth lobes linear, 5–6 mm. long, pilose outside with sparse minute appressed hairs; hypogynous scales united to form a membranaceous 4-denticulate cup about 0.6 mm. high; ovary densely brown-hirsute; style 4 mm. long, glabrous, clavate at apex; fruit broadly ovoid, only slightly asymmetric, subsessile, about 4.5 cm. long and 3 cm. in diameter, obtuse at base, abruptly contracted to the large mammiliform apex, smooth, glabrous.

Type in the U. S. National Herbarium, no. 861785, collected on hills of Santiago, near San Ramón, Costa Rica, in flower, May 1, 1901, by A. M. Brenes (no. 14303). The following additional collections are referred here: COSTA RICA: Fraijanes, Prov. Alajuela, alt. 1,600 m., *Standley & Torres* 47440. La Ventolera, on the southern slope of Volcán de Poás, alt. 1,700 m., *Standley* 34567.

The other species of *Panopsis* are South American, this being the first one reported for North America. The Costa Rican tree resembles in foliage characters Bolivian specimens collected by Bang and distributed as *P. Sprucei* Meisn., but the Bolivian species has a much shorter style and copious pubescence on branches and leaves.

Brunellia costaricensis Standl., sp. nov.

Medium-sized tree with rounded crown, the branchlets stout, glabrous or at first very sparsely pilose; leaves opposite, pinnate, the leaflets 7 to 10 (terminal leaflet often absent), the petiole and rachis together 8–28 cm. long, stout, subterete, glabrous; petiolules stout, 8–14 mm. long, shallowly sulcate above, glabrous; leaflets oblong, 7.5–13.5 cm. long, 2.5–5.5 cm. wide, rounded or obtuse at apex and abruptly short-cuspidate (cusp 5–6 mm. long, obtuse), at base broadly rounded to obtuse, somewhat unequal, remotely and very shallowly appressed-crenate, coriaceous, deep green above, glabrous, beneath pale, when very young rather densely sericeous with minute, closely appressed hairs, but soon glabrate, the costa impressed above, salient beneath, the lateral nerves very prominent beneath, 15–18 pairs, ascending, nearly straight, extending to the margin; panicles axillary, rather dense, many-flowered, about 16 cm. broad, much branched, pedunculate, the branchlets densely pilose with minute, ascending or subappressed hairs, the pedicles stout, 4–6 mm. long, jointed below the middle; calyx lobes 5, ovate to elliptic-oblong, 2–2.5 mm. long, acute or acutish, minutely sericeous on both surfaces; carpels of the fruit 4 or 5, when fully mature 3 mm. high, sessile, densely and minutely sericeous, the stout style lateral; seeds dark red-brown, very lustrous, smooth, 2.5 mm. long.

Type in the U. S. National Herbarium, no. 1,306,244, collected in wet forest at Yerba Buena, northeast of San Isidro, Province of Heredia, Costa Rica, altitude about 2,000 meters, February, 1926, by Paul C. Standley

and Juvenal Valerio (no. 49900). The species is represented by the following additional collections:

COSTA RICA: Yerba Buena, *Standley & Valerio* 49951. La Palma, alt. 1,460 m., *Tonduz* 12605 (*J. D. Smith* 7412).

This Costa Rican *Brunellia*, the only representative of the genus known from Central America, has been determined as *B. comocladifolia* Humb. & Bonpl., a species of Colombia and the Greater Antilles. The Colombian tree is strikingly different in its nearly sessile leaflets which are softly pubescent beneath with dense spreading fulvous hairs. Its carpels, also, are hispidulous.

Brunellia mexicana Standl., sp. nov.

Tree, the young branches stout, terete, glabrous, with short internodes; leaves opposite, pinnate, the leaflets 11 to 17, the petiole and rachis together 11–50 cm. long, slender, terete, glabrous or puberulent; petiolules 2–4 mm. long, puberulent or glabrous; leaflets oblong or lance-oblong, 6–14 cm. long, 2–4.5 cm. wide, acuminate or long-acuminate, at base somewhat oblique, rounded to obtuse, appressed-serrulate, subcoriaceous, deep green on the upper surface, short-pilose with appressed hairs along the nerves or glabrous, the costa impressed, beneath glaucous, when young velvety-pubescent, the pubescence in age mostly deciduous except along the nerves, the costa and lateral nerves prominent beneath, the latter about 19 pairs, arcuate, extending to the margin; panicles solitary in the leaf axils, about 15 cm. broad, densely many-flowered, the peduncles elongate, compressed, the branches densely tomentose; pedicels 4–7 mm. long, jointed near the base; calyx lobes 5, oblong-ovate, 2.5 mm. long, acutish, tomentulose on both surfaces, spreading in fruit; carpels of the fruit 4 or 5, at maturity 5 mm. long, compressed, the short stout style nearly basal, the carpels densely tomentose and hispid with short stiff hairs: seeds 2 mm. long, dark brown, scarcely lustrous.

Type in the U. S. National Herbarium, no. 1,265,699, collected at Tecomatla, Veracruz, Mexico, October, 1925, by C. A. Purpus (no. 10454).

The same species was collected in Oaxaca by Galeotti (no. 7247).

Brunellia mexicana is much closer to *B. comocladifolia* than to *B. costaricensis*. The Colombian species differs in the broader-based leaflets, green beneath and with prominent-reticulate secondary venation, and in the much smaller carpels. The pale under surface of the leaflets of *B. mexicana* is caused, perhaps, by a microscopic tomentum, or possibly by a waxy exudate.

Bauhinia Standleyi Rose, sp. nov.

Large woody vine, the stem often flattened and then 5 cm. or more broad; young branches with dense brown pubescence; tendrils slender, hairy; stipules small, broadly ovate to orbicular, 2 mm. long, hairy below, glabrous above, caducous; petiole 2–3 cm. long; leaf-blades broader than long, 3–5 cm. long, 2-lobed, sometimes cleft below the middle, the lobes rounded, 7 to 9-nerved, dull green, softly pubescent on both sides; inflorescence terminal, 4–5 cm. long, many-flowered, pubescent; bracts linear; pedicels slender, 10 mm. long or less, bearing 1 or 2 linear bractlets; calyx cup-shaped, 4–5 mm. long, the lobes 1–3 mm. long, linear; petals 5, very hairy below, 10–

12 mm. long, erect, greenish white, one of them with small purple spots; perfect stamens 10, glabrous; pods broadly spatulate, 6–7 cm. long, 2 cm. broad near the top, in age glabrate.

Type in U. S. National Herbarium, no. 1,152,798, collected by Paul C. Standley, near Punta Paitilla, Province of Panama, Panama, December 7, 1923 (no. 26247). The following collections represent the same species:

PANAMA: Taboga Island, *Macbride* 2800; *Standley* 27908. Ancón, *Piper* 6031. Along the Corozal Road near Panama, *Standley* 23776. Around El Paraíso, Canal Zone, *Pittier* 2577. Vicinity of Penonomé, *Williams* 134.

Cassia Killipii Rose, sp. nov.

Procumbent herb with long slender branches, often 1 meter long, the short pubescence interspersed with spreading hairs and more or less viscid; stipules minute; leaflets 2 pairs, orbicular to short-oblong, 5–10 mm. long, rounded at apex, glabrous above or nearly so, pubescent beneath, strongly veined; flowers axillary and solitary or somewhat paniculate above; flower bud obtuse, densely long-setose; sepals 8–9 mm. long, obtuse; petals 11–13 mm. long, brick-red; ovary densely setose; fruit setose, 2.5 cm. long, 5 mm. broad.

Type in the U. S. National Herbarium, no. 1,266,850, collected by E. P. Killip near the Tapia River, Province of Panama, Panama, December 9, 1917 (no. 3281). The following specimens are referable to this species:

PANAMA: Vicinity of Penonomé, *Williams* 104. Between Paso del Arado and Olá, Prov. Coclé, *Pittier* 5014. Along the Río Tapia, Prov. Panama, in savanna or on grassy slopes, *Standley* 28186, 30656.

Cassia pallidior Rose, sp. nov.

Low shrub, glabrous or nearly so; leaflets 12 pairs or fewer, narrowly oblong to orbicular, 1.5–3.5 cm. long, a little hairy when young but soon glabrate, very pale beneath, apiculate; stipules linear, caducous; gland between the lowest pair of leaflets large, clavate; inflorescence 2-flowered; peduncles and pedicels slender; flowers large; sepals thin, orbicular; petals orbicular to short-oblong, sometimes 3 cm. long; 3 of the anthers with long slender beaks; pod 12–15 cm. long, 5–6 mm. broad.

Type in the U. S. National Herbarium, no. 676,583, collected by H. Pittier near Alhajuela, Panama, January, 1914 (no. 2343). The following collections also belong to this species:

PANAMA: Sabana de Alhajuela, *Pittier* 3465.

COSTA RICA: Río Virilla, Prov. San José, *Tonduz* 9824 (*J. D. Smith* 7007), 12714 (*J. D. Smith* 7437).

Tephrosia Heydeana (Rydb.) Standl.

Cracca Heydeana Rydb. N. Amer. Fl. **24:** 166. 1923.

Pavonia fruticosa (Mill.) Standl.

Sida fruticosa Mill. Gard. Dict. ed. 8. *Sida* no. 18. 1768.
Pavonia typhalaea Cav. Diss. Monad. **3:** 134. 1787.

Pavonia Preslii Standl., nom. nov.

Malachra ovata Presl, Rel. Haenk. **2:** 125. 1835. Not *Pavonia ovata* Spreng. 1826.

Pavonia panamensis Standl.

Malache panamensis Standl. Contr. U. S. Nat. Herb. **18:** 116. 1916.

Hybanthus guanacastensis Standl., sp. nov.

Shrub 1.5–4.5 m. high, the branches densely leafy, the older ones slender, terete, grayish, the young ones sparsely or densely puberulent; stipules 2.5–3 mm. long, broadly ovate, glabrous, the costa and basal portion indurate, the costa excurrent as a subulate mucro, the margins scarious, whitish, ciliolate; petioles 2–5 mm. long, glabrous; leaf-blades oblong to oblong-elliptic, 4–10 cm. long, 1.5–4.5 cm. wide, acute to long-acuminate, at base rounded to acutish and conspicuously oblique, thin, glabrous, rather remotely and irregularly serrate-dentate, the teeth callous-tipped, the venation prominent on both surfaces; flowers axillary, solitary, the pedicels 6–10 mm. long, slender, glabrous, jointed above the middle; sepals ovate, 2 mm. long, acute or obtuse, thin, greenish, glabrous but ciliolate; lower petal 6 mm. long, panduriform, broad and inflated at base, constricted above, then expanded into a short broad truncate blade, glabrous, the upper petals 4 mm. long; filaments broad, about equaling the villous anthers, the connective expanded into a large thin quadrate appendage; immature capsule 6 mm. long, orbicular, glabrous, rounded at apex, the persistent style 2 mm. long.

Type in the U. S. National Herbarium, no. 1,254,104, collected in wet mountain forest at Los Ayotes, near Tilarán, Guanacaste, Costa Rica, altitude about 700 meters, January 21, 1926, by Paul C. Standley and Juvenal Valerio (no. 45423). To the same species are referred the following collections from Guanacaste:

COSTA RICA: Quebrada Serena, *Standley & Valerio* 46161, 46197. Los Ayotes, *Standley & Valerio* 45346.

Related to *H. mexicanus* Ging., which has flowers only half as large on much shorter pedicels.

Hybanthus tenuifolius (Dowell) Standl.

Calceolaria tenuifolia Dowell, Bull. Torrey Club **33:** 550. *pl. 18.* 1906.

Hybanthus longipes (Dowell) Standl.

Calceolaria longipes Dowell, Bull. Torrey Club **33:** 551. *pl. 19.* 1906.

Hybanthus glaber (Dowell) Standl.

Calceolaria glabra Dowell, Bull. Torrey Club **33:** 552. *pl. 20.* 1906.

Hybanthus brevis (Dowell) Standl.

Calceolaria brevis Dowell, Bull. Torrey Club **33:** 552. *pl. 21.* 1906.

Hybanthus angustifolius (H. B. K.) Standl.

Ionidium angustifolium H. B. K. Nov. Gen. & Sp. **5:** 377. 1821.

Hybanthus riparius (H. B. K.) Standl.

Ionidium riparium H. B. K. Nov. Gen. & Sp. **5:** 378. 1821.

Hybanthus nigricans (Dowell) Standl.

Calceolaria nigricans Dowell, Bull. Torrey Club **33:** 554. 1906.

Hybanthus humilis (Rose & Dowell) Standl.

Calceolaria humilis Rose & Dowell, Contr. U. S. Nat. Herb. **10:** 125. *pl.* 42. 1906.

Hybanthus Rosei (Dowell) Standl.

Calceolaria Rosei Dowell, Bull. Torrey Club **33:** 555. *pl. 22.* 1906.

Xylosma Hemsleyana Standl.

Hisingera elliptica Clos, Ann. Sci. Nat. IV. **8:** 226. 1857.
Xylosma elliptica Hemsl. Biol. Centr. Amer. Bot. **1:** 57. 1879. Not *X. elliptica* Tul. 1868.

Symplocos Johnsonii Standl., sp. nov.

Tree 18 m. high, the branchlets subterete, glabrous, bearing few large elevated lenticels; petioles stout, 12–18 mm. long, broadly channeled above, glabrous; leaf-blades oblong or elliptic-oblong, 11.5–22 cm. long, 4.5–8 cm. wide, abruptly acute, with obtuse tip, acute or acuminate at base, subcoriaceous, entire or essentially so, glabrous, lustrous above, the costa impressed above, prominent beneath, the lateral nerves very slender, about 14 on each side, arcuate-ascending, laxly anastomosing near the margin; inflorescence few-flowered, dense and congested, the flowers sessile; calyx-tube 2 mm. long, glabrous, the lobes broadly rounded, 2 mm. long, minutely ciliolate, otherwise glabrous; corolla 16 mm. long, the tube 8–9 mm. long, 2.5 mm. thick, the 5 lobes obovate or oblong, rounded at apex, glabrous; stamens very numerous, free above, equaling the corolla lobes, the filaments connate into a tube, very unequal, finely and densely papillose, not collected in recognizable fascicles, stout, abruptly contracted near the apex into a very slender tip; style 16 mm. long, densely hirsute below.

Type in the U. S. National Herbarium, no. 1,081,463, collected at Samac, Alta Verapaz, Guatemala, altitude 1,350 meters, October 20, 1920, by Harry Johnson (no. 874).

This species belongs to Brand's section *Symplocastrum*, subsection *Pseudoalstonia*, and in his key to the group, in the Pflanzenreich, runs at once to *S. quindiuensis*, of Colombia. That species has much smaller leaves and a smaller corolla. Among the Central American species, *S. Johnsonii* is conspicuous because of its large leaves.

The collector reports that the flowers are rose-pink and very fragrant. It is a pleasure to be able to name this fine species for Mr. Johnson, who obtained in Alta Verapaz in 1920 one of the most interesting and most carefully prepared collections of plants ever made in Guatemala.

Chelonanthus alatus (Aubl.) Standl.

Lisianthus alatus Aubl. Pl. Guian. 204. 1775.

Scutellaria argentata Leonard, sp. nov.

Tall slender herb (only the upper portion of plant available for study); stem dark purplish, glandular-pubescent; petioles 1–1.5 cm. long, densely glandular-puberulent; leaf-blades oblong-elliptic or oblong-obovate, obscurely panduriform, acuminate at apex, narrowly cordate at base, rather coarsely serrate with flat teeth, both surfaces bearing shiny silver dots, glabrous except the glandular-puberulent midrib and veins of the lower surface, the veinlets inconspicuously reticulate; flowers numerous, crowded in a terminal raceme about 8 cm. long; rachis strongly glandular-puberulent; bracts linear, 2–3 cm. long, about 0.5 mm. broad, obtuse, deciduous; pedicels 2–2.5 mm. long, glandular-puberulent; calyx 4 mm. long, the lobes reddish purple, glandular-pubescent, the crest small; corolla bright crimson, sparingly pubescent, 4–5 cm. long, the tube slender, 4 mm. broad at throat, gradually narrowed to 2 mm. at base, the upper lip much larger than the lower, the middle lobe rounded, deeply emarginate, curving over the stamens, the lateral lobes short, oblong, 25 mm. long, 8–9 mm. broad, the lower lip triangular, rounded, shallowly notched at apex; stamens didynamous, curved at tip, glabrous, the upper pair 2 mm. longer than the lower, the anthers of the upper pair 1-celled, oval, 1.25 mm. long, 0.75 mm. broad, those of the lower pair 2-celled, broadly ovate, 1.25 mm. long and broad, cordate at base, slightly emarginate at apex; style equaling the upper pair of stamens, curved at tip, glabrous, the stigma unequally 2-lobed, the lobes spreading; ovary glabrous, on a conical gynobase 1 mm. long and 1.5 mm. broad at base; nutlets not seen.

Type in the U. S. National Herbarium, no. 1,266,817, collected at La Florida, Costa Rica, in 1925, by C. H. Lankester.

This attractive plant is well marked by its long slender crimson flowers, glandular pubescence, and silvery-punctate leaves. The slightly paniduriform leaf-blades suggest a relationship with *S. costaricana*, but that species can be separated easily by its smaller corolla and eglandular pubescence.

Gonzalagunia rudis Standl.

Duggena rudis Standl. Contr. U. S. Nat. Herb. **18**: 125. 1916.

Since there is some doubt as to the identity of the plant described as the type of the genus *Duggena*, it is preferable to use for this group of Rubiaceae the next older name, *Gonzalagunia*.

Pentagonia pubescens Standl.

Watsonamra pubescens Standl. Contr. U. S. Nat. Herb. **17**: 441. 1914.

The generic name *Pentagonia* Benth. has been rejected because of *Pentagonia* Vent. (1841), but the latter does not seem to be effectively published.

Pentagonia Donnell-Smithii Standl.

Watsonamra Donnell-Smithii Standl. Contr. U. S. Nat. Herb. **17**: 442. 1914.

Pentagonia Pittieri Standl.

Watsonamra Pittieri Standl. Contr. U. S. Nat. Herb. **17**: 443. 1914.

Pentagonia brachyotis Standl.

Watsonamra brachyotis Standl. Contr.U. S. Nat. Herb. **17**: 443. 1914.

Pentagonia gymnopoda Standl.

Watsonamra gymnopoda Standl. Contr. U. S. Nat. Herb. **17**: 444. 1914.

Pentagonia alfaroana Standl.

Watsonamra alfaroana Standl. Journ. Washington Acad. Sci. **15**: 287. 1925.

Cephaelis nana Standl.

Evea nana Standl. Journ. Washington Acad. Sci. **15**: 105. 1925.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE PHILOSOPHICAL SOCIETY

947TH MEETING

The 947th meeting, constituting the 56th annual meeting, was held in the Cosmos Club auditorium on December 11, 1926. It was called to order by President BOWIE at 8:19, with 46 persons present.

The report of the Treasurer showed total receipts, $1753.08; disbursements, $1207.73, leaving a balance of $545.35. The report of the secretaries showed that 19 meetings were held during the year, several in conjunction with other societies.

The following officers were elected for the year 1927: *President*, J. P. AULT; *Vice-Presidents*, L. H. ADAMS and P. R. HEYL; *Treasurer*, W. D. LAMBERT; *Recording Secretary*, H. E. MERWIN; *Member-at-Large, General Committee*, O. S. ADAMS.

At the conclusion of the business meeting, Mr. L. H. ADAMS presented an address entitled *What we know about the interior of the earth* (Illustrated by lantern slides). The outer parts of the earth have been thoroughly explored, at the surface and to a depth of a mile or so, but the sum total of our knowledge of the deeper parts of the earth is not very large. And yet the mysteries are slowly being solved. From varied sources information has been gathered and pieced together to form a picture of earth's interior—a picture as yet crude and imperfect but one which is gradually being made clearer and more complete.

Volcanoes bring up material from considerable depths and show us that beneath the cooler surface is a hot and active interior; the amount of radioactive substance found in ordinary rocks indicates that unless the earth is,-and always has been, growing hotter, the interior must be of a very different composition from that of the surface layers; geological studies have given us a store of information concerning the structure and composition of the rocks found at the surface and allow us to make certain deductions as to the way in which the character of the rocks should vary with depth; laboratory measurements on gravitational attraction tell us the density of the earth as a whole and indicate the presence of very dense material at the center; astronomical data on the motion of the earth give us the moment of inertia of the

earth, from which the distribution of density in the interior can be inferred; and finally, the most important of all, the transmission of earthquake waves through the earth, taken in conjunction with laboratory measurements on the elasticity of rocks, yield very definite and conclusive evidence concerning the nature of the earth's material at various depths.

The present state of the earth is closely connected with the manner of its formation. It is generally agreed that the earth, as well as the other planets, were formed from the sun during the close approach of another star, which by tidal action pulled out large masses of glowing gas from the surface of the sun. One of these detached masses first liquefied and then solidified to form the earth. In the two billion years that have elapsed since its solidification, the temperature except in the outer few dozen miles has not changed appreciably. In the center of the earth is a core of iron, about 6000 km. in diameter, which settled out during the liquefaction. From the surface of the iron core upwards to the lower surface of the "crust" there is mainly ultrabasic rock (iron magnesium silicates) while the crust itself, 60 km. in thickness, consists of the ordinary granitic and gabbroic rock with a very small amount of sedimentary material at the surface. The rigidity of the earth, except near the center and near the surface, is everywhere greater than steel. The pressure increases steadily with depth and is about three million atmospheres at the center. The temperature in the very interior is unknown but is probably several thousand degrees. Further advances in our knowledge of the earth's interior will come mainly (1) from a higher precision in seismic data and (2) from a complete understanding of the physics of the atom so that the behavior of substances at all temperatures and pressures can be predicted. (*Author's abstract.*)

H. A. MARMER, *Recording Secretary.*

ENTOMOLOGICAL SOCIETY

379TH MEETING

The 379th regular meeting was held Thursday, December 3, 1925, in Room 43, National Museum, with President R. A. CUSHMAN in the chair and 25 members and 5 visitors present.

C. T. GREENE reported the death of Mr. H. W. WENZEL, Coleopterist, of Philadelphia. He was born in Philadelphia, May 16, 1858, and died there November 5, 1925, aged 67 years. A committee was appointed to draw up suitable resolutions.

Election of officers followed: President, J. M. ALDRICH; 1st Vice-president, J. A. HYSLOP; 2nd Vice-president, J. E. GRAF; Editor, CARL HEINRICH; Corresponding Secretary-Treasurer, S. A. ROHWER; Recording Secretary, C. T. GREENE; Executive Committee, W. R. WALTON, A. N. CAUDELL, T. E. SNYDER; Representative of the Society to the Washington Academy of Sciences, Dr. A. G. BÖVING.

Program: Dr. N. E. MCINDOO: 1. *Senses of the boll weevil.* (Illustrated.) 2. *An insect alfactometer.* This apparatus was on exhibition and its mechanism was explained to the society.

Mr. R. A. CUSHMAN told of rearing a species of *Sympiesis* as an external parasite of the eggs of *Cimbex americana* (Leach). The species of *Sympiesis* are normally parasitic on leaf-mining Lepidoptera and the speaker was of the

opinion that the location of the host in this case was the determining factor leading to its parasitization by the *Sympiesis*.

Dr. ALDRICH spoke of an interesting chapter in the history of Dipterology, giving an account of Meigen's visit to Kiel, Copenhagen, and Lund in 1824, at the expense and in the company of Wiedemann. This trip is described in Förster's biographical sketch of Meigen in Stettiner Ent. Zeitung for 1846.

Mr. J. L. WEBB made some remarks on the Thurbaria weevil, stating that it was considered a variety of the boll weevil.

Mr. K. W. BABCOCK spoke briefly, mentioning some of his experiences during a recent trip to Europe.

380TH MEETING

The 380th regular meeting was held Thursday, January 7, 1926, in the National Museum, with President J. M. ALDRICH in the chair and 25 members and 11 visitors present.

Report of the Corresponding Secretary-Treasurer for 1925 was read and accepted.

Dr. H. E. EWING, Chairman of the Committee which examined the Treasurer's books, reported the books correct. Mr. C. T. GREENE read his report as Recording Secretary for 1925. The reports were accepted.

Dr. O. A. JOHANNSEN of Cornell University was elected to membership.

Program: W. H. WHITE: *Plant resistance to insect injury.* Discussion by BACK, ROWHER, and BAKER.

AUSTIN H. CLARK: *Odors of male butterflies.* Discussion by BAKER, EWING ROHWER and SNODGRASS.

Mr. ROHWER exhibited a photograph of Dr. Walther Horn, of Germany, and his assistant, Miss Christel Doering.

Mr. J. A. HYSLOP spoke briefly to the Society on Mr. Chapman's book on insect equilibrium. Discussed by ALDRICH, BAKER, and SNODGRASS.

Mr. R. C. SHANNON exhibited several species of Syrphidae showing good examples of mimicry. This material was from the British Museum. He also spoke briefly about his forthcoming trip to Argentina.

E. A. BACK: *A Note on* Anthrenus seminiveus *Casey.* This Dermestid closely resembles the furniture beetle, *Anthrenus fasciatus.* The only reference to *seminiveus* is by Casey when he described the type, found in the building where he lived. After about 10 years two instances of destruction caused by this insect have been brought to the attention of the Department of Agriculture within a short time of each other during late 1925. In one case the brushes of a shoe-polishing outfit, in a hotel about half a mile from the building in which Colonel Casey lived, were ruined. In the other building in which Colonel Casey lived, a divan upholstered in curled hair, Spanish moss and tow, was found, on removing the cover, to harbor several thousand beetles and larvae. This is to be published shortly in the Proceedings of the Entomological Society of Washington by E. A. BACK and R. T. COTTON.

Mr. ROHWER recorded the occurrence of the European sawfly, *Acantholyda erythrocephala* (Linnaeus), in Pennsylvania. This European sawfly is a well known pest to European coniferous trees and two specimens were taken in a nursery at Chestnut Hill, Pa., May 7, 1925, by F. F. Smith and A. B. Wells. Both of these specimens were males.

Mr. ROHWER also recorded a second specimen of *Zadiprion townsendi* (Cockerell). This specimen was collected by W. J. Chamberlin, Santa Rita Mts., Arizona, July, 1924, and is the second specimen known. *Zadiprion*

townsendi (Cockerell) was described in 1898 from a single female collected under a pine tree in the White Mountains of New Mexico. It is closely allied to *Zadiprion grandis* (Rohwer), an enemy to rock pine in Nebraska. Discussion by BAKER and EWING.

Dr. J. M. ALDRICH mentioned a case in nomenclature, where the name of a variety proved to be antedated by a name which also antedated the species. He asked whether in this case the variety becomes the species, or whether this relation is to be determined on taxonomic grounds without reference to priority.

381ST MEETING

The 381st meeting was held Thursday, February 4, 1926, in the National Museum with President J. M. ALDRICH in the chair and 29 members and 6 visitors present.

Program: R. A. CUSHMAN, retiring President: *Some types of parasitism among the Ichneumonidae.* (Illustrated by numerous lantern slides.) Discussion by Messrs. HOWARD, ALDRICH, BAKER, and GAHAN.

F. C. CRAIGHEAD: *Forest insects.* (Illustrated by numerous lantern slides showing the effect of the insect damage on the trees.)

382D MEETING

The 382d meeting was held at 8 p.m., March 4, 1926, in the National Museum, with President J. M. ALDRICH in the chair and 30 members and 15 visitors present.

Program: VERNON L. KELLOGG: *Memories of a veteran entomologist, Dr. F. H. Snow.* Dr. Snow was born at Fitchburg, Mass., June 29, 1840, and died Sept. 20, 1908. He studied to be a Congregational minister. He was at the University of Kansas 42 years and was very much interested in zoology, botany and entomology. A great deal of teaching was done in the field and 26 or 28 major collections were made. Dr. KELLOGG told interesting stories and incidents of some of these trips. He talked of the formation of the insect collection, and mentioned several of Dr. Snow's famous students.

Discussed by Dr. HOWARD, who spoke of W. A. Snow, son of Dr. F. H. Snow.

Dr. WM. SCHAUS exhibited some books from the Dognin Library. These books were given to Dr. SCHAUS personally for raising the money to buy the Dognin collection of Lepidoptera. These books were of the 17th and 18th centuries. Dr. SCHAUS spoke briefly of his impressions of the British Museum after an absence of 13 years.

Dr. ALDRICH said that Dr. Williston sold his collection of Diptera to the University of Kansas in order to buy the H. H. Smith Collection of Diptera from the West Indies and Brazil. This latter collection was afterward sold to the American Museum of Natural History in New York City.

There was a general discussion on parasitism.

Mr. JACK BELLER of the Southern Museum of Los Angeles, California, spoke briefly to the Society.

Mr. J. E. GRAF exhibited specimens of the Mexican bean beetle showing some variations.

CHAS. T. GREENE, *Recording Secretary.*

383D MEETING

The 383d meeting was called to order at 8:10 p.m., Thursday, April 1, 1926, in the National Museum with first Vice-president HYSLOP in the chair, and 18 members and 10 visitors present.

The Corresponding Secretary, Mr. ROHWER, read a circular letter from the International Institute for Intellectual Cooperation connected with the League of Nations requesting information on methods of distribution of technical publications in foreign countries. This matter was referred by the Society to the Corresponding Secretary, with power to act.

Dr. A. L. MELANDER, of the College of the City of New York, and Miss GRACE SANDHOUSE of the Federal Horticultural Board, were elected to membership.

Program: W. A. HOFFMAN, of Johns Hopkins University: *Biological notes on Haitian Anophelines.* (Illustrated by lantern slides.) The two species of *Anopheles* known from Haiti, *A. grabhamii* and *A. albimanus*, were discussed, emphasis being placed upon the relations between the larvae of these species and their environment. *A. albimanus* in the main chose still water exposed to the sun, *A. grabhamii*, shaded streams. In some localities springs were of little importance as breeding areas of *A. albimanus*, while in other localities larvae abounded in them. The difference was ascribed to the different plant constituents present in the springs of these regions. Rice fields were carefully studied owing to the high incidence of malaria in coastal areas where this crop was grown. *A. grabhamii* seldom occurred in such situations. The two species reach their greatest abundance at different times, *A. albimanus* reaching its peak during the last third or quarter of the year, *A. grabhamii* as a rule in the period from January through March. Where favorable conditions obtain at all times great numbers of *A. albimanus* can be taken throughout the year. *A. albimanus* is believed to be the form chiefly responsible for the transmission of malaria. (*Author's abstract.*)

Asked in regard to food material Mr. HOFFMAN stated it to be blue green algae, *Spirogyra*, diatoms and plankton. Mr. ROHWER asked in regard to control, which was stated to be primarily cleaning out vegetation. HYSLOP and BAKER asked further questions in regard to control and Dr. S. F. BLAKE asked in regard to the deleterious effect of *Chara*.

Miss B. M. BROADBENT: *Notes on the habits and development of the Azalea leaf miner*, Gracilaria Azaleella *Brants.* (Illustrated by lantern slides.) This species appears to be a native of Japan and first reached the United States prior to 1912 on azaleas imported from Holland. It has since become established in New York, New Jersey, Pennsylvania, Florida and the District of Columbia. An infestation of the azalea leaf miner at the U. S. War Department greenhouses in 1923 was brought to our attention and afforded an opportunity to study its habits and development. The moth deposits minute eggs singly close to the midrib on the ventral leaf surface which hatch about a week later. The larva immediately enters the leaf and feeds as a leaf miner for from ten to sixteen days, molting twice before cutting its way out and becoming a leaf roller. At first only the extreme tip is folded downward and attached to the midrib, but after each molt the larva cuts its way out and moves to a fresh leaf where it infolds and skeletonizes a greater area. The process of webmaking gives evidence of its remarkable industry. One larva while attaching leaf margins with webbing was observed to balance on its prolegs and sway to and fro 2367 times in one hour. For a period of 25 con-

secutive minutes it averaged 55 oscillations per minute or nearly one per second. As many as thirty strands may be attached between two points before changing position. By working from either side of the midrib the webbing is cross hatched, and shorter strands bring the surfaces in contact. The ends are filled with fan shaped webbing which is later snipped out to bring opposing edges in contact. Folded leaves are often cone-shaped. The larval period varied from 20 to 34 days during April, whereas the previous generation had required about 55 days.

When ready to pupate the larva attaches strands of webbing across each end of the slightly rolled edge of the ventral leaf surface, filling in the central area last. Before emergence it forces itself half way out of its cocoon so that the moth leaves the exuvia projecting from it. The pupal period varied from 7 to 16 days. The sexes appeared in about equal numbers. One female deposited 40 eggs. Longevity varied from 1 to 9 days. (*Author's abstract.*)

Messrs. SIMMONS and SCHAUS discussed the emergence of the pupa from the cocoon. Dr. ELY stated that a native species of *Gracilaria* in Connecticut on swamp azalea is badly parasitized. Mr. ROHWER and Dr. WEIGEL stated that in the introduced species there were no parasites. The out-door distribution of the species was given as New York, Pennsylvania, Connecticut and Florida. Dr. CORY of Maryland found similar work on azalea in breeding beds.

Under notes and exhibition of specimens Dr. BÖVING showed a plate with habitus figures and anatomical details of the larva of the flea beetle *Oedionychis gibbitarsa* (Say). He described a few of the characteristic structures of the larva, especially the maxillary mala. The latter is apparently single, but consists (as a comparison with other Chrysomelid larvae proves) in reality of a well developed galea and a large lacinia that is situated behind galea and completely fused with it. The galea carries a two-jointed peg and irregularly distributed setae; the lacinia is armed with a longitudinal series of long stiff setae. The remarkable bilobed mala in the *Donaciinae*, strongly adapted for sapsucking purposes, is a further development of the morphologically simpler structures in the *Halticinae* and other Chrysomelid larvae, combined with the presence of a long stylus from the end of lacinia as it occurs in several Coleopterous larvae, for instance, in many *Ptinoid* larvae but not in the *Halticinae*.

Dr. HOFFMAN inquired in regard to the food habit of *Blephridae*. Mr. BARBER stated that it was sumac.

SPECIAL MEETING

On April 20 a special meeting of the Entomological Society was held at which Vice-president, J. E. GRAF, called the meeting to order and requested Dr. HOWARD to preside. Dr. HOWARD in introducing the speaker, Dr. R. J. TILLYARD of Cawthron Institute, Nelson, New Zealand, stated that this was only the third time a special meeting had been called to honor distinguished foreign visitors. Dr. TILLYARD talked on the fossil insects in the more important and larger orders and showed some excellent pictures of the fossils, which were of great interest to systematists of the Bureau of Entomology. Some of the prototypes of present families and groups were of particular interest, especially in the case of the roaches and beetles, there being some slight indication of a common ancestor of these two groups as well as a common ancestor between the roaches and termites.

384TH MEETING

The 384th meeting was held on May 6, 1926, in the National Museum. It was called to order by the Corresponding Secretary, Mr. S. A. ROHWER, who in the absence of other officers, requested Mr. A. B. GAHAN, a past president, to preside. There were present 13 members and 12 visitors.

Program: Dr. W. J. NOLAN: *Sex forms of honeybees.* (Illustrated.) Although some knowledge of parthenogenesis in the honeybee is credited to Aristotle, a scientific basis as to the sexes found in the honeybee was not forthcoming until Swammerdam in the latter part of the seventeenth century established the sex of the queen. Before that time many curious ideas existed as to the three castes, and the method of reproduction in a colony. Some even held that the honeybee arose by spontaneous generation from decaying flesh. In the latter part of the eighteenth century, over one hundred years after Swammerdam's discovery, Huber, the blind Swiss investigator, made known the fact that the queen mates on the wing outside the hive. In Germany shortly before this time, Riemer had established, or re-established if Aristotle is kept in mind, the fact that in a queenless colony certain of the workers may begin to lay, but that their eggs will develop only into drones. Not long after this, Schirach had found that a colony deprived of its queen, but possessing worker larvae not too old, can rear another queen from one of the worker larvae. It remained for Dzierzon, in 1842, after empirical evidence from mating experiments on two differently colored races, the Italian and German brown, to set forth the theory that workers and queens arise from fertilized, and drones from unfertilized eggs. Neither the findings of Dzierzon, nor any of the other men mentioned, remained unchallenged. It was not until the 20th century, following a series of cytological investigations culminating in the work of Nachtsheim, that Dzierzon's opponents were routed. One in particular, Dickel, had maintained that all eggs are fertilized, but that the workers by use of a salivary secretion determine which are to develop as males and which as females. Nachtsheim in his paper of 1913 found no evidence of fertilization in eggs from drone cells, but abundant evidence in eggs from worker cells. Furthermore he confirmed the reports of earlier investigators that the germ cells of the drone at all times contain only the haploid number (16) of chromosomes, while the fertilized eggs, from which only females develop, have the diploid number (32). Onions in South Africa in 1909, and again in 1912, announced to a rather skeptical world, that the worker of the South African honeybee, as contrasted with that of the European honeybee, could rear workers and queens parthenogenetically. This work was confirmed in 1916 by Jack, Entomologist for South Rhodesia. Further work on this subject is now reported in progress, especially on the cytological side. It should be noted that the African races of honeybees, as a group, have sufficient distinct characteristics from the European races, as a group, to have led Von Buttel-Reepen to classify them as distinct subspecies.

That a queen can be reared from any worker larva, given the proper food and attention, although the basic principle in the extensive queen-rearing business of the present time, has never been adequately explained. Doctors Becker and Zander in Germany last year gave the results of their endeavors to get intermediate forms between worker and queen by taking unsealed worker larvae of all ages and transferring them to queen-cells by the method commonly employed in queen-rearing. They found that only larvae

not more than three and one-half to four days old would develop into queenbees. After this narrow time boundary physical modifications typical of workerbees are too far advanced, whereas the development of the reproductive organs is so arrested that larvae in worker cells are no longer capable of becoming queenbees. The first introduction of pollen in the food of the worker larva seems to mark the end of the time when it can develop into a queenbee. The exact factors involved in this arrested development of the reproductive system, however, remain to be cleared up. (*Author's abstract.*)

Mr. ROHWER in commenting on Dr. NOLAN's talk stated that a new species of *Apis* has been discovered in Australia. He also stated that students in Europe had discovered a parthenogenetic and fertile stage in the sweat-bee, *Halyctus*, and probably this would have some effect on the deduction in the theories in regard to the life of the social bees. Mr. ROHWER further inquired concerning subspecies and Dr. NOLAN stated that they are usually referred to as races or varieties, but Von Buttel-Reepen referred to them as subspecies. Dr. SNYDER asked in regard to the progeny of the egg-laying workers and Dr. NOLAN stated that they were all drones but that the spermatheca is slightly larger. Dr. SNYDER also referred to Miss C. B. Thompson's work begun with Dr. Gates of Massachusetts Agricultural College on morphological, cytological and experimental work on the worker and queen in the honeybee to determine whether there were marked differences in the brain, sex organs, etc., in these two castes and whether the "royal jelly" fed to the three day old worker really changed it to a queen or whether there was not some inherent cause, such as there is in termites and ants in the origin of caste.

Dr. T. E. SNYDER: *Insects change building code.* (Illustrated.) Owing to lack of information on the destructiveness of our 42 species of native termites, buildings are often erected improperly. In consequence termites greatly damage the woodwork of the buildings. It is a great hardship for small householders to make expensive repairs before the building has been paid for. Such damage is serious in the Southern States, the Central West and Pacific Coast. The only effective permanent preventive is proper construction of buildings and insulation of all untreated woodwork from contact with the ground. Slight changes in city building codes have been suggested to city engineers throughout the United States and with the help of the National Utilization Commission it is believed that ant-proofing buildings by modification of building codes will be possible. Many large government buildings in Washington have been damaged by termites, but active cooperation has been affected with the Superintendent of Buildings and Grounds to prevent such damage in the future. As object lessons, model demonstration termite-proof buildings are being erected in the Canal Zone, Panama, and at New Orleans, La. In addition to complete insulation of all untreated wood from the ground by the use of concrete foundations or timbers treated with coal tar creosote against subterranean termites, not more than 10 per cent of lime mortar should be used for making cement or brick foundations, since termites penetrate lime mortar. Together with these precautions in regions where non-subterranean termites are a serious menace all interior wood-work and furniture must be impregnated with zinc chloride or sodium fluoride. (*Author's abstract.*)

Mr. ROHWER asked if there would not have to be different building code changes for the subterranean and non-subterranean termites. Dr. SNYDER stated that this was the case. Mr. WOOD discussed damage to nursery stock, potatoes and the woodwork of buildings in Kansas. Mr. GAHAN asked in

regard to termite damage to structure in rural regions and Dr. SNYDER stated that very often farmers use tin termite guards between the foundations and upper woodwork. Mr. SIMMONS asked in regard to the method of impregnating wood with sodium fluoride. Dr. SNYDER stated it to be by the "open tank" method and gave details.

The Corresponding Secretary, Mr. ROHWER, called upon Mr. O. MORLAND, of England, to say something about honeybees. He stated that Isle of Wight disease due to an Acarine parasite was believed to be absent from the United States and that this was probably true since the method of dissection was the same in the United States as in England. He had reached these conclusions after a conference with Dr. Sturtevant. Mr. MORLAND further stated that exclusion of bees from countries where this disease occurred was wise. Mr. GAHAN thanked Mr. MORLAND for his kind words about the federal quarantine laws in the United States which are so generally being criticized at present.

Mr. MORRISON discussed a recent paper on hermaphrodism in scale insects and stated that if this work proved true it would have wide application and it might be found to apply in other groups of insects.

385TH MEETING

The 385th meeting was called to order at 8 p.m., on June 3, 1926, in the National Museum by Vice-president J. HYSLOP.

PERCY VIOSCA, Jr., of New Orleans, La., who was to have been the first speaker was unable to appear.

Program: J. A. HYSLOP: *The Bureau of Entomology's exhibit at the Sesquicentennial exhibition at Philadelphia.* (Illustrated.) In addition to exhibiting the lantern slides prepared by various branches of the Bureau, maps were shown of the exposition grounds showing where the exhibits would be housed.

Mr. P. SIMMONS gave a talk on the history of carbon bisulphide as a fumigant and the discovery of its fumigating properties. Credit for the discovery of the insecticidal property of carbon disulphide has generally been accorded to Louis-Michel-Francois Doyère. However, the evidence shows that, although Doyère made the discovery independently, his work was anticipated by Dr. Lazare Garreau, who published his results in 1854. Doyère's account of his discovery appeared in 1857, following experiments carried on at Algiers. Both investigators first used the method for the control of insects infesting stored grain. For this purpose, and for the control of certain insects living in the soil, carbon disulphide still remains our chief reliance after a lapse of about 70 years. Doyère (1811–1863) was a teacher of zoology and natural history. He was much interested in the conservation of grain, and published on milk, ensilage, and economic entomology. Garreau (1812–1892) started as a military pharmacist, in which capacity he served several years in Algiers. From 1844 until his retirement in 1886, he was a teacher of medical chemistry, toxicology, and related subjects in various institutions in the city of Lille. Among his publications on a number of subjects, some of the most important dealt with the respiration of plants.

Mr. A. B. GAHAN recorded the death of Dr. H. S. SKINNER, who had long been connected with the Academy of Natural Sciences, Philadelphia, and was for many years editor of Entomological News. It was moved by the Society that an obituary committee be appointed and Vice-president Hyslop announced that this committee would be named later.

Mr. GAHAN exhibited a drawing of a Chalcid egg parasite in Cicada eggs from Meyers of New Zealand. The peculiar arrangement of the ovipositor in a sac folded under the body was illustrated in this peculiar new genus.

Mr. C. L. LANKAN exhibited specimens of insects found in flower pots. Mr. BARBER determined them as small *Collembola*.

Mr. WOOD stated that in a shipment of passenger's baggage were hampers full of sparta grass used in making paper, and that 9 species of insects including Chrysomelid beetles and jointworms were found hibernating in the grass.

Dr. SNYDER gave a short note on the amoebae and spirochaetes recently found living in the intestines of termites by various workers and stated that since the aborigines or natives of some tropical countries ate termites alive possibly there was a relation between these forms of life in the termites and pathogenic forms in man. It was stated that very little was known of these spirochaetes but that in the history of human disease caused by these organisms there may have been a relationship in the past.

Mr. GAHAN stated that he had received a letter from Mr. James Waterston of the British Museum containing the statement that what purported to be the Motschulsky Collection of Hymenoptera had been discovered in an attic room of Moscow University at Moscow. If true, this would make it possible to fix the identity of a number of genera and species which are now in doubt. Much interest was evidenced in this reported location of the Motschulsky collection, Mr. BARBER discussing his collection of Coleoptera and other members his work in other orders.

THOS. E. SNYDER, *Recording Secretary pro tem.*

386TH MEETING

The 386th meeting was called to order at 8 p.m., October 7, 1926, in the National Museum, with President ALDRICH, in the chair and 24 members and 12 visitors present.

Attention was called to the fact that the committee on the obituary notice of Dr. HENRY SKINNER had taken no action so far.

Mr. ROHWER stated that it seemed likely that there would be a vacancy in some of the offices of the Society, especially that of the editor, before the next regular election, and moved that the executive committee be empowered to fill any vacancies that may occur before the next annual election. The motion was carried.

Program: J. M. ALDRICH: *Collecting Diptera in Guatemala.* The speaker spent April and May in Guatemala, paying especial attention to the collection of muscoid flies. While there he traversed the railroads from Puerto Barrios to the Mexican border at Ayutla and also visited the Pacific Coast at San José. April being in the end of the dry season the collecting was not very gòod. In May, at the special request of the Minister of Agriculture at Guatemala he accompanied a government party to Cobán for the purpose of assisting in investigations of the migratory locust and its parasities. Cobán being considerably off the railroad it was necessary to ride a mule about 100 miles to reach it. The return trip was made by a different route coming out by the Polochic River, Lake Isabel and Livingston. The amount of material collected was considerably less than expected, but some progress was made in the study of the parasites of the locust, and other interesting results were obtained.

C. T. GREENE: *Collecting fruit flies in Panama.* A brief outline of the localities collected in while in Panama from March 14 to May 27, 1926 was

given, and an idea of the breeding methods used. The speaker reported the capture of a rare Tachinid fly *Bibiomima Handlurschii* B. B. at Ancon, C. Z., April 7, 1926. This is the first North American record and the second specimen known.

Dr. STEPAN SOUDEK told how much he appreciated the help given him by various people while in America. He said he had gained much valuable knowledge regarding the insects.

Mr. A. F. BURGESS of Melrose Highlands, Mass., mentioned some points in the work being done by Brown, Meusebeck, and Webber on parasites of the gipsy moth.

Dr. J. B. PARKER: *Vespula* (*Dolichovespula*) *diabolica* (Saussure). On August 1 of this year the superintendent of the grounds at the Catholic University of America, Brookland, D. C., reported that he had found a nest of "yellow hornets," which were later identified by Mr. ROHWER as *Vespula* (*Dolichovespula*) *diabolica* (Saussure). Twice before a nest of "yellow hornets," presumably this same species, had been found on the University grounds and been burned before the speaker was aware of what was going forward, and it was at his request that this one was reported to him instead of being destroyed at once. In every case the nest had been placed on an evergreen tree and no nest had been over six feet from the ground. In order that the identity of the species might be determined, a single specimen was captured on August 7 as it was leaving the nest. This specimen proved to be a young queen. On the next day the nest was damaged in a storm by being dashed against a broken branch on a neighboring limb of the tree on which the nest was built. The wasps repaired this damage to the side of the nest and in order to guard against any further damage from this source the speaker removed the broken limb. The nest was secure until August 21, but when next visited, on the 24th, it was found to be completely destroyed. A small part of the nest and some of the comb still remained attached to the branch on which the nest was built and the rest was scattered about on the ground. Everything indicated that the destruction had been the work of mischievous boys. In a piece of the comb were found two fully developed males just ready to emerge when the nest was destroyed. These were mounted so that in the collection of the Museum are two males and one female of this species taken from the same nest. Aside from these two males, the combs were empty, neither larvae nor pupae being present. The nest had been destroyed a day or two before the speaker discovered the fact, so that what evidence was obtained indicates that this species rears its males and young queens in early August. The nest, so far as can be judged from its appearance while on the tree, does not differ from that of the whitefaced hornet (*Vespa maculata*). What differences, if any, might be found by taking the nests of the two species apart and comparing their structure are not known. It is to be hoped that another nest of these yellow wasps will be found and that observations may be carried on under less discouraging conditions.

Dr. M. C. HALL gave a brief outline of his recent trip to Central America. He was especially interested in animal parasites.

387TH MEETING

The 387th meeting was called to order at 8 p.m., November 4, 1926, in the National Museum, with President ALDRICH in the chair.

Messrs. HYSLOP, CUSHMAN and SCHAUS were appointed as a committee to draw up resolutions on the death of Doctor HENRY SKINNER.

At the suggestion of Mr. ROHWER the Corresponding Secretary was instructed to send appropriate greetings to the Entomological Society of Hungary to be read at the commemorative meeting held to celebrate the 80th birthday of Dr. Geza Horvath to be held on November 23, 1926.

Program: H. E. EWING· *Recent developments in regard to the control of chiggers.* All the states in the life history of the chigger have been obtained but the egg stage. We are not sure that an egg stage exists, but in all other species of the family to which the chiggers belong, as far as life histories are known, eggs are laid. At the Summer Boy Scout Camp, located on Chesapeake Bay, the following control measures proved effective: sulphuring of the badly infested spots, including several of the paths, the cleaning up of all dead leaves and other litter near the tents, the protection against chiggers by applying sulphur to the skin and clothing. The common box turtle proved to be the most important natural host. Turtles of this species are being removed and in their place the camp ground is being stocked with the painted turtle, mud turtle, spotted turtle, and musk turtle, none of which carry chiggers.

Discussion by Messrs. GAHAN, ALDRICH, SNODGRASS, and ROHWER.

Dr. W. H. LARRIMER spoke briefly on the practical nature of the corn-borer problem. Discussion by Messrs. HYSLOP, ROHWER, CUSHMAN.

The Society congratulated Dr. and Mrs. W. M. MANN on their marriage.

Dr. A. G. BÖVING gave a general characterization of the larvae of the *Eumolpinae,* discussed their relationship to the larvae of the other Chrysomelid subfamilies, mentioned that the genera and especially the species of the *Eumolpinae* are very insufficiently represented in the National Museum by their immature stages, and concluded with the following comments on the characters by which some of the species could be recognized: The larvae of *Chrysochus auratus* (Fab.) has projecting parasternal lobes on the abdomen, suggesting hairy prolegs, each anal lobe carries a single chitinous plate, the mandible terminates with three teeth, and there is one ocellus on each side of the head. An unknown species from Tennessee, feeding on the roots of broom-sedge and weeds, is very similar to *Chrysochus auratus,* but has two circular plates on each anal lobe, the mandible terminates with two teeth and there are three minute ocelli on each side. The larva of *Paria canella* (Fab.) has distinct and hairy, but not projecting, parasternal lobes, the anal lobes are without any chitinization, the ninth abdominal tergite is posteriorly equipped with four chitinous, rounded tubercles and the mandible has two terminal teeth close together plus one lateral tooth. In the larva of *Typophorus viridicyaneus* (Cr.), from the roots of sweet potatoes, the mandible carries two terminal teeth plus one lateral tooth as in *Paria canella,* and it is also similar to this species in all other structural characters except in that the ninth abdominal tergite has no chitinous posterior tubercles. *Graphops pubescens* (Melsh), *Fidis viticida* Walsh, *Colaspis costipennis* Cr. and *Colaspis flavida* Say are very close to *Typophorus viridicyaneus,* but they can be distinguished from this species by the single character that they all possess, a mandible in which two terminal teeth are more or less united and a lateral tooth is lacking. From each other they can not be separated by any structural difference.

Mr. J. A. HYSLOP read a letter and a portion of a manuscript from Dr. G. N. WOLCOTT of Porto Rico on the flight of the butterflies at Port-au-Prince, Haiti.

Dr. J. M. ALDRICH spoke briefly on the gatherings of the entomologists at Pingree Park, Colorado. He exhibited a copy of the "Report of the 4th Rocky Mountain Conference of Entomologists at Pingree Park, Colorado,

August 16–21, 1926." Containing a list of those present, notes on the meeting, and a list of officers for 1927.

Mr. ROHWER exhibited "Insects of Western North America," by Prof. E. O. ESSIG and commented on the book as containing much new biological information concerning the species, a fairly satisfactory classification, an extensive bibliography, and many original illustrations. Mr. ROHWER believed that this was one of the best books on insects which has been issued recently, and contained more names of insects than any other book of its size.

Dr. T. E. SNYDER spoke briefly on the parasites of termites.

Mr. C. T. GREENE reported the finding of larvae of *Rhagoletis pomanella* Walsh in prunes from North Chatham, New York, October 5, 1926. The material was received from Dr. E. P. FELT.

CHAS. T. GREENE, *Recording Secretary*

SCIENTIFIC NOTES AND NEWS

The National Academy of Sciences will meet in Washington April 25, 26, and 27, in the National Research Council building. On Monday night, April 25 there will be a popular science lecture for the public.

The American Geophysical Union will meet April 28 and 29 in the national Research Council building. On the evening of the 28th there will be a lecture for the public on climatic factors.

The remainder of the botanical collections of Captain JOHN DONNELL SMITH, presented to the Smithsonian Institution in 1905, were recently received by the National Herbarium. The total number of the John Donnell Smith Herbarium is well above 100,000. It is especially rich in Central American plants and contains the types of the numerous species described by Captain DONNELL SMITH. The collection was mounted and in excellent condition. It is now accessible for study at the National Herbarium.

The Botanical Society of Washington held a special meeting March 15 in room 43 of the New National Museum. Dr. C. C. PLITT, of the School of Pharmacy, University of Maryland, gave an illustrated talk on the distribution and succession of lichens. Dr. E. W. BERRY, of Johns Hopkins University, discussed early forms of vascular plants, especially those of the Devonian formation, with lantern slides showing restorations. Dr. BURTON E. LIVINGSTON, of Johns Hopkins University, showed a device for measuring available water-supply in surface soil. It consists of a small subcylindrical cone of porcelain, the tip and upper part impervious to water, and with a porous zone about 1 cm. wide. Investigations were carried on in a lawn of the University by means of these mechanical root-tips. Dr. DUNCAN S. JOHNSON, of Johns Hopkins University, gave an illustrated talk on the revegetation of a valley in Jamaica which had been denuded by a landslide following unusually heavy rains seventeen years ago.

The Elk Commission, called by the Secretary of War as chairman of the President's Conference on Outdoor Recreation, held a meeting in Washington from February 28 to March 3, to consider the problem of preventing the starvation of the southern Yellowstone herd of elk in bad winters in the region of Jackson Hole, Wyoming. The history of this herd shows that hard winters following a period of favorable years reduces the herd so seriously as to threaten their extermination. A plan of administration was decided upon for the preservation of this, the largest herd of elk in existence. Not more than

20,000 elk are to be maintained. The present winter range will not support this number in unusually hard winters, so it was recommended that the Federal Government acquire certain private lands, which, being added to the existing Federal game refuge and the adjacent property of the Izaak Walton League, would provide feed to carry the elk through the bad winters. An immediate count of the elk was recommended, the plans to be developed by the supervisor of the Teton National Forest, the game warden of the Biological Survey at Jackson Hole, and a representative of the Wyoming State Game and Fish Commission. It was proposed that the Biological Survey make a study of the life history of the elk and of conditions bearing upon their maintenance in suitable numbers. It was recommended that the Wyoming Game and Fish Commission be given wide latitude in handling such problems as length of hunting seasons, bag limits, and the establishment of hunting areas, and also authority to remove by official killing and disposal for economic use any surplus that might remain after hunting. E. A. GOLDMAN and T. S. PALMER, of the Biological Survey, WILL C. BARNES, of the Forest Service, are members of the Commission.

J. E. SPURR, Editor of the Engineering and Mining Journal, and formerly a member of the United States Geological Survey, addressed the Petrologists' Club in the Director's room at the Geological Survey March 14, on *Ore magmas and vein dikes.*

Professor JOHANNES WALTHER of the University of Halle, Speyer Visiting Professor at Johns Hopkins University, spoke to the Pick and Hammer Club on March 19 on *The formation of red beds in the deserts of Western Australia.*

E. O. ULRICH, G. R. MANSFIELD, H. D. MISER, L. W. STEPHENSON, C. H. DANE, PARKINSON POPENOE, W. T. THOM, JR., and C. E. DOBBIN of the United States Geological Survey attended the meeting of the American Association of Petroleum Geologists at Tulsa, Oklahoma, March 24–26. Mr. ULRICH and Mr. DOBBIN read papers.